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## The Daily Times

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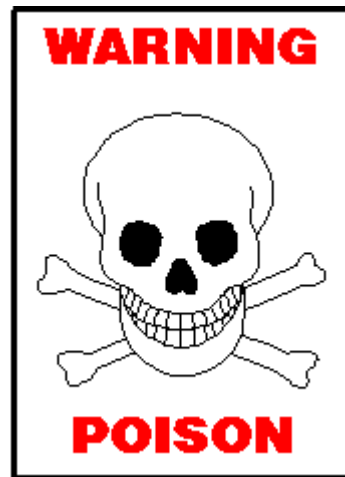
Woburn Edition

June 9, 1981

This article originally appeared in  
*The Daily Times*, Woburn, Mass., on the date indicated.

### 65 Chemicals Found in Subsurface Water

*(The chemicals, and concentrations of chemicals identified in this article give an idea of the complexity and level of contamination of the ground water in the two Woburn Superfund sites [Industri-Plex 128 and the G and H well site]. The lawsuit filed by the eight Woburn families alleged three chemicals caused the illnesses and childhood leukemia -- trichloroethylene (TCE), tetrachloroethylene (PERC) and 1,2-trans-dichloroethylene (DCE). Very little research can support that contention. However, when all of the chemicals in the ground water are taken into consideration, particularly the benzene -- one of the few known causes of leukemia -- then it is much easier to argue that the water caused the leukemia. In 1996, the [Massachusetts Department of Public Health](#) unequivocally determined that exposure to the water was a cause of the cluster of leukemia cases. It is also easier to argue that the trichloroethylene and other chemicals named in the suit could have acted in a synergistic manner with the other chemicals to cause the leukemia. There was ample evidence that the three chemicals caused damage to the immune systems of all of the family members tested for such disorders.)*



By CHARLES C. RYAN

WOBURN - A diluted chemical soup flow under the fields, businesses,

industries and homes from South Wilmington through North and East Woburn and into the northerly end of Winchester along the Aberjona River valley.

Tests results of water taken from 32 wells (which are not used for drinking purposes) show a total of 65 chemical contaminants, the vast majority of them at very low, part-per-billion, detection levels.

The tests were performed by Ecology and Environment, Inc. (E&E) of 28 Park East, Washington Street, Woburn and the results of those tests will be aired at a public meeting Wednesday night at 7:30 p.m. in the Thompson Library.

An earlier, related series of tests conducted at businesses and at a number of sewer locations found similar chemicals, mostly in the low part-per-billion range, in the MDC and Woburn sewers which also follow the Aberjona River Valley.

E&E and state and federal environmental officials said they will be examining the likelihood that the sewers are a possible source of, or perhaps a conduit for, some of the chemicals.

While all but a few of the chemicals were found at levels which are not a cause for concern, the sheer number of chemicals found, several of them in many of the wells, may be a cause of concern, according to several experts.

"There is almost no research on the effects of the mixture of chemicals on people or animals. This is an area of great concern, because most incidences of contamination involve more than one chemical substance," states the Ecology and Environment report.

65 chemicals

Traces of benzene, for instance, were found in 14 of the 32 wells. Most of the wells had very low concentrations, less than 10 parts per billion, but one well showed 76 parts-per-billion.

Benezene is known to cause leukemia in humans and leukemia and tumors in laboratory animals when its fumes are breathed at industrial exposure levels as well as a number of other physiological symptoms such as fatigue, loss of appetite, and loss of weight. But benzene does not cause the same kind of leukemia found in the children in East Woburn. There are no federal or state standards for an acceptable level of benzene in drinking water and very little data on the effects of benzene if it is ingested by humans.

Trichloroethylene (TCE) was found in 27 of the 32 wells, mostly in low concentrations, though two wells showed high levels. A well owned by the J.J. Riley Co. (near G and H wells) had 1,372 part-per-billion and a well

owned by Atlantic Gelatin had 2,290 parts-per-billion when it was tested by the state a year ago. That well was closed and dismantled shortly afterwards by Atlantic Gelatin. Both wells were used industrially not for drinking water.

Trichloroethylene has been found to cause tumors in laboratory mice, but not in rats and there is little data on the possible effects as a human carcinogen. Federal regulations allow 21 parts-per-billion of trichloroethylene in drinking water.

A well owned by Olin Corporation in Wilmington was heavily contaminated with a number of chemicals including nitrosodiphenylamine, nitrobenzene, toluene and Di-N-butylphthalate. (Olin has an agreement with the state to conduct tests and clean up the chemical wastes left by the chemical companies which previously owned the property).

Other chemicals found in the study include: 1,1,1-trichloroethane, in 12 of the 32 wells; 1,2-trans-dichloroethylene in 16 of the 32 wells; methylene chloride in 15 of the 32 wells; toluene in 15 of the wells; lead in 10 wells; arsenic in 8 wells; mercury in 8 wells, and chromium in 11 wells. A list of all 65 chemicals found and the number of wells they were found in appears elsewhere in the paper as well as several charts showing the concentrations found in each well.

#### **450 million years old**

A geological study of the Aberjona River Valley also conducted by E&E shows the underlying bedrock is between 450 and 630 million years old, dating from the Precambrian and Paleozoic eras.

The aquifers resting atop the bedrock, however, were mostly deposited during the Late Wisconsin glacier which retreated through the Aberjona and Mystic River valleys around 14,000 years ago.

According to the Ecology and Environment, Inc., study, which used a seismic testing device to determine the depth from the surface to the underlying bedrock, the aquifers of sand, gravel and clay run 80 feet deep near G and H wells and down to 160 feet near the Woburn-Winchester line.

Most of the wells in the Aberjona River Valley were drilled into that surface glacial and alluvial fill, though there are several deep rock wells as well.

According to the study, there is a deep pocket of glacial fill near G and H wells and then a hump in the bedrock between there and Walker's Pond where the next depression begins.

The EPA and DEQE plan to drill 20 more wells to determine the extent of the chemical contaminations so far discovered and to possibly identify point

sources for the chemicals.

In addition, the study will try to determine if the chemical contaminants, many of them heavier than water, remain trapped in the first depression, or find their way over or around the hump in the bedrock to the wells in the southeasterly section of Woburn. The groundwater generally flows south along the river valley at a rate measured in feet per year.

### **Unknown health effects**

The E&E study did not attempt to assess any health effects which might be caused by drinking water from the tested wells for a number of reasons.

First, the contract did not call for such assessments; second, determining health effects is usually not within the scope of the DEQE or EPA's job when there are other agencies such as the Mass Department of Public Health and the federal Center for Disease Control available; third, because it is practically impossible to make such a determination; and fourth, because none of the wells is currently used for drinking water purposes.

None of the water tested has been used for drinking purposes, except for G and H wells, which were used on an irregular basis, mostly in the summer, for a little more than a decade before they were shut down in May of 1979.

All of the water presently supplied to the city for drinking purposes comes from wells located in West Woburn and from the MDC tie-in in East Woburn and that water has been tested repeatedly and meets with state and federal approval.

Several of the chemicals found are known human health hazards and have set standards, or levels, allowed in drinking water.

These include arsenic, mostly in wells on JanPet property at the end of Atlantic Ave., which was found in concentrations ranging from 100 to 7,000 parts-per-billion -- 50 parts-per-billion is the highest level allowed in drinking water. The Janpet wells are near the arsenic lagoon and chromium ponds on Mark Phillip Trust property and some concentrations of those chemicals were also found on Janpet property in July 1979.

Chromium was found in 11 wells in concentrations ranging from 10 to 2,070 parts-per-billion -- the highest level allowed in drinking water is 50 parts-per-billion. While hexavalent chromium is known to cause harm when it is breathed, little is known about its effects when ingested.

Lead, another known health hazard, was found in 10 wells in concentrations ranging from 440 to 4,550 parts-per-billion -- 50 parts-per-billion is the highest level allowed in drinking water. Curiously, 270 parts-per-billion of lead was found in water taken from G well, but previous tests found much

lower levels or none at all.

Mercury, highly toxic when consumed in its organic form, was found in 8 wells in concentrations, ranging from 1.1 parts-per-billion to 2.4 parts-per-billion in 7 of the wells, but one had 49 parts-per-billion-the highest level of mercury allowed in drinking water is 1 part-per-billion.

A number of chemicals, the health effects of which are known and unknown, have no state or federal standards. There is no standard or set level for benzene, for instance, even though it is a known carcinogen when its fumes are breathed.

Other chemicals, which are a necessary part of our diet such as iron, have levels of acceptability based on esthetic, rather than health effects. Iron, manganese and other metals discolor water and give it an odor and taste most people find unacceptable even though those concentrations are considered safe by all known standards.

### **Little test data**

Many of the organic chemicals have no predetermined levels of acceptability because there has been little study done of their possible health effects.

E&E Toxicologist Anne Marie Desmarais explained that toxicology itself (the study of the toxic effects of chemicals on living organisms) is a relatively new science.

She also noted that for many chemicals, the only information or data available is from industrial use where workers are exposed to higher than normal concentrations on a daily basis.

For many other chemicals, few animal or human studies have been done to determine their health effects, or the data obtained has been contradictory.

The big unknown and concern, she said, is possible synergistic effects.

Synergism is the theory, proven in a number of cases, that the presence of several chemicals can increase the toxic effects of one or more of them; or contrarily, the presence of one or more chemicals can have a negating influence on the toxic effects.

People who consume a regular amount of selenium, for instance, reportedly have slightly lower rates of death from cancer and selenium has been found to offset the effects of other chemicals such as arsenic, but selenium in high concentrations can be harmful, even though it is a necessary part of human nutrition, according to Dr. John Little of the federal Centers for Disease Control in Atlanta.

## **Alcohol increases dangers**

Dr. Little said that at least two chemicals, alcohol and carbon tetrachloride, are known to drastically increase the synergistic effects of chemicals.

Phenobarbital, a sedative, also highly increases the synergistic effects of several chemicals, according to Toxicologist Desmarais.

David Cook, Senior Geological Engineer for Ecology and Environment, Inc. said that E&E test crews abstain from alcohol 24 hours before and 24 hours after they visit a potentially dangerous site of chemical contamination.

He said staying off of alcohol was not necessary to conduct the water tests from the wells, but it would be done for soil tests at the contaminated Mark Phillip Trust property at the end of Commerce Way.

Cook also said that no testing crew is allowed to eat on or near a contaminated site.

Other chemicals which are not currently considered harmful to humans can still pose a threat to the environment.

A number of phthalates (pronounced falates) for instance, were found in water taken from a well in Wilmington owned by Olin Corporation on Eames Street.

While data available presently indicates phthalates are probably not harmful to humans (one form of phthalate is used to make the bags used by the Red Cross to collect blood), they do have a tendency to bind up free oxygen in the water, depriving fish and other aquatic creatures of that vital breath of life, according to E&E Toxicologist Demarais.

## **Do chemicals move?\*\*\***

The EPA plans to drill 20 new test wells in the area ranging from South Wilmington to the northeast end of Winchester to further pinpoint the sources of the 65 chemicals found, according to site coordinator Richard Leighton. (At this point, all of the experts concur that just because a certain chemical is found in a well on a specific piece of property does not necessarily mean the chemical originated from that piece of property.)

In addition, the new wells will help the EPA determine if the chemicals found in the southeasterly corner of Woburn might have originated further upstream.

E&E Senior Geologist Cook explained that many of the chemicals, both those lighter than water and those heavier than water, have a tendency to settle.

Because of that, the new wells, particularly the four wells which will be drilled across the "hump" or up-thrusting of the bedrock, will help determine if the chemicals found in the 80 foot deep low point near G and H wells are, or are not, flowing south to the deeper low spot in the southeasterly corner of Woburn and the northeast section of Winchester.

The present tests show a concentration of many of the chemicals around the upper low point in the geological charts and another concentration in the lower end, near Walker's Pond and further south near the intersections of Grape and Washington Streets.

### **Sweetwater Brook**

In addition, one of the new wells will attempt to intercept a flow of ground water from Stoneham along the path of Sweetwater Brook.

The test results which will be presented Tuesday night indicate contamination may be entering the southeasterly Woburn area and northeasterly Winchester area from Stoneham.

Last week, Woburn Alderman Bernard J. Golden told the EPA and DEQE that there has been a broken sewer line near Sweetwater Brook for at least two years.

State and federal officials concur that the brook itself, and/or the sewer line are possible sources of chemical contamination.

In addition to the tests for natural elements, volatile organics and other organic chemicals on the EPA's list of 129 priority pollutants, the study found several wells contaminated with very low, trace amounts of several pesticides.

In all but two of the wells in which the pesticides were found, the pesticide findings were below 5 parts-per-billion. The two other wells also had low findings of 5 and 23 parts-per-billion.

Last week, Leighton of the EPA and Richard Chalpin, the state's DEQE site coordinator, indicated the new series of water, air, surface water and soil tests may begin this summer or early fall if all goes well.

Three days later, the US Senate and House approved a \$68 million Superfund appropriation for the coming fiscal year.

There is a good chance that the approval of the Superfund funds will speed up the testing process.

*\*\*\*(Do chemicals move? Originally, all of the experts contacted expressed the belief that the heavy metals in North Woburn probably would not travel*

*along the Aberjona River to the wells or beyond. But then more studies were done and determined that spring surges in the river flow could move the heavy metals, but not significantly. An even more startling discovery was announced later. It appears that a particular form of bacteria evolved at the arsenic lagoon. Its action on the arsenic turned the heavy metal into a form which was more water soluble, and more likely to travel to, and down, the river. Back to the possible causes of leukemia. Most of the benzene findings were not in very high concentrations, except for one. But that particular location was downstream from wells G and H. Was that high a level of benzene ever in the wells? It is almost impossible to determine the original source of the chemical, or whether it passed through the location of wells G & H.)*